R E M A R K S

Reconsideration of this application, as amended, is respectfully requested.

THE SPECIFICATION

Submitted herewith is a Substitute Specification which incorporates the amendments made in the Preliminary Amendment filed on February 12, 2002 concurrently with the filing of the application. No additional changes have been made and no new matter has been added, and it is respectfully submitted that the Substitute Specification overcomes the Examiner's objection to the specification. Accordingly, it is respectfully requested that the Substitute Specification be approved and entered and that the objections to the specification be withdrawn.

THE CLAIMS

Claim 1 has been amended to recite the features formerly recited in (now canceled) claims 2-4, and claims 1 and 5 have also been amended to make some minor grammatical improvements and/or to correct some minor antecedent basis problems so as to put the claims in better form for issuance in a U.S. patent. No new matter has been added, and it is respectfully requested that the amendments to the claims also be approved and entered.

THE PRIOR ART REJECTION

Claims 1-5 were rejected under 35 USC 103 as being obvious in view of various combinations of USP 5,409,069 ("Olwert") with USP 5,719,468 ("Takanishi"), USP 5,883,468 ("Hobbs") and USP 5,808,399 ("Yoneyama"). These rejections, however, are respectfully traversed with respect to amended claims 1 and 5.

Halogen lamps for the headlights of cars and trucks are well known. Due to the different main voltage of cars (typically 12 volts) and trucks (typically 24 volts), the halogen lamps for the headlights of these types of vehicles differ too.

Usually, halogen lamps used in cars comprise single coiled filaments whereas halogen lamps used in trucks comprise double coiled filaments because the filament wires of the latter need to be longer for providing a higher ohmic resistance to obtain the typical value of electrical power consumption for the headlight lamps of trucks of about 50-60 watts. The disadvantages of double coiled filaments, including non-uniform illumination, are described on pages 1-2 of the Substitute Specification (and page 1 of the original specification).

The present invention relates to a new type of halogen lamp for the headlights of trucks having a nominal main voltage of 24 volts, wherein the halogen lamp of the claimed present invention comprises single coiled filament (instead of the usual double coiled filament). More specifically, according to the present

invention as recited in amended claim 1, a halogen lamp for motor vehicle headlights which has an electrical power consumption of between 50 watts and 100 watts is provided which comprises at least one incandescent filament formed as a single coil whose dimensions and/or geometry are matched to an operating voltage of at least 20 volts, wherein the single coil has a length in a range from 4.0 mm to 6.5 mm, a wire diameter between 0.11 mm and 0.14 mm, an outside diameter between 1.4 mm and 2.0 mm, and at least 20 turns.

With respect to the cited references, it is respectfully pointed out that Olwert does not disclose a halogen lamp suitable for use in motor vehicle headlights. This is because the halogen lamp disclosed in Olwert is constructed for operation at 240 volts. In addition, it is respectfully pointed out that the halogen lamp disclosed in Olwert comprises a double coiled filament (also referred to as a coiled coil filament) instead of a single coiled filament as according to the claimed present invention. Still further, the values of 1.9 mils (0.0475 mm) and 3 mils (0.075 mm) for the diameter of the filament wire disclosed in Olwert are much lower than the range of 0.11-0.14 mm recited in amended claim 1, and the value of 18mm for the length of the coil disclosed in Olwert is three times the maximum value as according to the present invention as recited in amended claim 1.

Takanishi does disclose a halogen lamp for motor vehicle headlights which comprises a single coiled filament. In Takanishi, however, the values for the outer diameter (1.3 mm) of the single coiled filament and for the diameter (0.18 mm) of the filament wire do not meet the conditions of the present invention as recited in amended claim 1.

Hobbs discloses a halogen lamp for motor vehicle headlights comprising two single coiled filaments whose values for outside diameter and length of the coils fall in the claimed ranges, but neither the number of turns (only 17) nor the diameter of the wire in Hobbs fall within the conditions of the present invention as recited in amended claim 1. In this connection, moreover, it is respectfully pointed out that the comparatively high wire weight of 90.52 mg disclosed in Hobbs (see column 3, line 64) is an indication that the filament wire has a comparatively large diameter, and it is noted that the wire weight of the filament according to the preferred embodiment of the claimed present invention, for example, is only 31.9 mg (with the wire weight of the filament according to the preferred embodiment of the claimed present invention being calculated from the diameter of the wire 0.13 mm, the length of the wire 124.8 mm and the density of tungsten 19.27 g/cm^3).

Accordingly, it is respectfully submitted that the structure of the present invention as recited in amended claim 1 is novel

in light of each of Olwert, Takanashi, and Hobbs. In addition, is also respectfully submitted that one of ordinary skill in the art of developing a halogen lamp for motor vehicle headlights for operation at a voltage exceeding 20 volts would not even consider the teachings of Olwert (which does not disclose a halogen lamp suitable for use in motor vehicle headlights), and that one of ordinary skill in the art would have had no motivation to combine the teachings of Olwert with the teaching of Takanishi and/or Hobbs since the halogen lamp disclosed in Olwert has a huge coil length and a very high operating voltage and since Olwert discloses a double coiled filament whereas Takanashi and Hobbs disclose single coiled filaments. In this connection, moreover, it is respectfully pointed out that the filaments of halogen lamps for motor vehicle headlights have to be matched to the optical properties of a headlight reflector to generate a well-defined low beam or high beam.

Still further, it is respectfully submitted that the combination of Olwert and Takanishi would not achieve the structural feature of the claimed present invention whereby the single coil has a wire diameter of 0.11-0.14 mm and an outside diameter of 1.4-2.0 mm. And it is also respectfully submitted that the combination of Olwert and Hobbs would similarly not achieve the structural feature of the claimed present invention whereby the single coil has a wire diameter of 0.11-0.14 mm and

at least 20 turns. Yet still further, it is respectfully pointed out that the combination of a double coiled filament and a single coiled filament would result in a triple coiled filament.

And finally, it is respectfully submitted that the cited references do not provide any motivation for the combinations suggested by the Examiner. In this connection, it is noted that one of ordinary skill in the art would be just as likely to combine the number of turns according to Hobbs with the outside diameter of the coil according to Takanishi, as to combine the number of turns according to Takanishi with the outside diameter of the coil according to Hobbs.

In summary, it is respectfully submitted that the claimed present invention as recited in amended claim 1 comprises a combination of features - namely, a specific single coil length, wire diameter, outside diameter and number of turns - which contribute to a more uniform illumination and which are important for the electrical resistance of the filament which must fit to the operation voltage. In this connection, it is noted that the geometry and dimensions of the filament also determine the rigidity of the filament, and that the geometry and dimensions of the filament must be matched to the headlight reflector.

In view of the foregoing, it is respectfully submitted that Olwert, Takanishi and Hobbs are not properly combinable references, and that even if they were combinable they would

still not achieve or render obvious the features of the present invention as recited in amended claim 1.

Accordingly, it is respectfully submitted that amended claim 1 and amended claim 5 depending therefrom patentably distinguish over the cited references, taken singly or in any combination, under 35 USC 102 as well as under 35 USC103.

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Entry of this Amendment, allowance of the claims and the passing of this application to issue are respectfully solicited.

If the Examiner has any comments, questions, objections or recommendations, the Examiner is invited to telephone the undersigned at the telephone number given below for prompt action.

Respectfully submitted,

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Substitute Specification

Halogen lamp

This application is a U.S. National Phase Application under 35 USC 371 of International Application PCT/DE01/02318 (not published in English) filed June 22, 2001.

Field of the Invention

The invention relates to a halogen lamp for motor vehicle headlights which has an electrical power consumption of between 50 watts and 100 watts and has at least one incandescent filament.

Background of the Invention

There are commercially available halogen lamps for headlights of motor vehicles with a vehicle supply voltage of 12 volts. These halogen lamps have a power consumption of about 50-100 watts and at least one incandescent filament, the incandescent filament being singly wound and designed for an operating voltage of approximately 12 volts.

There are also commercially available halogen lamps for headlights of motor vehicles with a vehicle supply voltage of 24 volts. These halogen lamps have a power consumption of between 50 watts and 100 watts and at least one incandescent filament, the incandescent filament being doubly wound and designed for an operating voltage of at least 20 volts. To ensure adequate vibration resistance, the singly wound ends of the doubly wound incandescent filament are provided with insertion pins. Instead of an insertion pin, in each end of the singly wound filament there may remain a residual amount of the core wire which was etched

out by means of acid only from the light-emitting, doubly wound region of the incandescent filament, but not out of its singly wound ends. The secondary coil of this doubly wound incandescent filament has only very few turns. The illumination which can be achieved with it has an inhomogeneous effect.

Summary of the Invention

It is an object of the invention to provide a halogen lamp for motor vehicle headlights with a power consumption of between 50 watts and 100 watts which can be operated on a vehicle supply voltage of 24 volts and ensures homogeneous illumination.

This object is achieved according to the invention by forming the incandescent filament as a single coil, the dimensions and/or geometry of which are matched to an operating voltage of at least 20 volts. This length of the single coil is in the range from 4.0 mm to 6.6 mm.

In the case of the halogen lamp according to the invention, the at least one incandescent filament is formed as a single coil, the dimensions and/or geometry of which are matched to an operating voltage of at least 20 volts, the length of the single coil having a value in the range from 4.0 mm to 6.5 mm. By being fitted with the single coil according to the invention and by interacting with the reflector of the motor vehicle headlight, it is possible with the halogen lamp according to the invention to achieve a more homogeneous illumination than with the aforementioned, previously customary halogen lamps. The restriction of the length of the single coil according to the invention to a range from 4.0 mm to 6.5 mm ensures by the interaction with the reflector of the motor vehicle headlight a directed light emission and a well-defined cone

of light. The single coil of the halogen lamp according to the invention has three to four times the number of turns and a significantly smaller distance between the individual turns than the secondary coil of the doubly wound incandescent filament of the previously customary halogen lamps for headlights of motor vehicles with a rated vehicle supply voltage of 24 volts. The single coil of the halogen lamp according to the invention is advantageously provided with a least 20 turns, which are evenly distributed over the length of the single coil to achieve illumination which is as homogeneous as possible.

As a difference from the 12 V halogen lamps described above as prior art, the halogen lamp according to the invention has, on account of the higher operating voltage, as the incandescent filament a single coil which is produced from a wire which is thinner and approximately twice as long as the single coil of the 12 [lacuna] halogen lamp. To ensure a great vibration resistance in spite of the thinner wire, the ends of the incandescent filament of the halogen lamp according to the invention are advantageously provided with supporting means. Preferably suited as supporting means are supporting filaments or tubes produced from molybdenum foil or molybdenum strip which enclose the unwound ends of the single coil.

The single coil of the halogen lamp according to the invention advantageously has at least 20 turns and an outside diameter of between 1.4 mm and 2.0 mm, so that the halogen lamp according to the invention has, in spite of the comparatively long wire which is used for producing the incandescent filament, a spatially compact single coil as the incandescent filament. The diameter of the wire used for producing the incandescent filament advantageously lies between 0.11 mm and 0.14 mm, on the one hand to adapt the

filament resistance to the desired power consumption of the halogen lamp according to the invention and on the other hand to make it possible for a spatially compact single coil to be used as the incandescent filament.

Brief Description of the Drawings

The invention is explained in more detail below on the basis of two preferred exemplary embodiments. In the drawing:

figure 1 shows a schematic side view of a halogen lamp according to the invention for a motor vehicle headlight with a singly wound, axially arranged incandescent filament

figure 2 shows a plan view of an axial filament according to the first exemplary embodiment of the invention in a schematic representation

figure 3 shows a plan view of a transversal filament according to the second exemplary embodiment of the invention in a schematic representation

figure 4 shows a plan view of a single coil according to a third exemplary embodiment of the invention in a schematic representation.

Detailed Description of the Drawings

The halogen lamp according to the first exemplary embodiment has an essentially cylindrical lamp vessel 1 with a gastight-sealed pinch foot 2, through which two power supply leads 3, 4 for the incandescent filament 5 arranged

in the axial direction within the lamp vessel 1 are led. The pinch foot 2 is fixed in the lamp base 6, which is provided with two contact lugs 7 for supplying voltage to the incandescent filament 5. Figure 1 schematically shows the construction of this halogen lamp. This is a halogen lamp for a motor vehicle headlight with a power consumption of approximately 70 watts, which is intended for operation on a rated vehicle supply voltage of 24 volts.

According to the first exemplary embodiment of the invention, the incandescent filament 5 is formed as a single coil which has a length of approximately 5.6 mm ±0.2 mm, an outside diameter of approximately 1.7 mm and 26 turns. The aforementioned specifications relate to the wound region of the incandescent filament 5, responsible for the light emission, without taking into account the unwound ends 5a of the incandescent filament 5. The tungsten filament wire used for producing the single coil 5 has a diameter of 0.13 mm. The effective length of the filament wire, that is to say the length of the filament wire forming the wound region of the single coil 5, is approximately 124.8 mm. The unwound ends 5a of the incandescent filament 5 are respectively provided with a covering filament 8 to improve the vibration resistance and to support the incandescent filament 5. The covering filaments 8 enclose the respective unwound ends 5a with a clamping fit. They preferably extend over the greater part of the respective unwound end 5a. In figure 2, the construction of the incandescent filament 5 according to the first exemplary embodiment is schematically represented.

According to the second exemplary embodiment of the invention, the incandescent filament 5' is formed as a transversal single coil, that is to say a single coil arranged perpendicularly to the lamp axis, which has a length of approximately 5.2 mm ±0.2 mm, an outside diameter

of approximately 1.9 mm and 23 turns. The aforementioned specifications relate to the wound region of the incandescent filament 5', responsible for the light emission, without taking into account the unwound ends 5a' of the incandescent filament 5'. The tungsten filament wire used for producing the single coil 5' has a diameter of 0.13 mm. The effective length of the filament wire, that is to say the length of the filament wire forming the wound region of the single coil 5', is approximately 124.9 mm. The unwound ends 5a' of the incandescent filament 5' are respectively provided with a covering filament 8' to improve the vibration resistance and to support the incandescent filament 5'. The covering filaments 8' enclose the respective unwound ends 5a' with a clamping fit. They preferably extend over the greater part of the respective unwound end 5a'. In figure 3, the construction of the incandescent filament 5' according to the second exemplary embodiment is schematically represented.

Both single filaments 5, 5' described in more detail above are adapted on the basis of their dimensions and geometry to an operating voltage of approximately 24 volts and a power consumption of approximately 70 watts.

The single filament 5'' according to the third exemplary embodiment, depicted in figure 4, differs from the single filaments of the two exemplary embodiments explained above only in that the unwound ends 5a'' are respectively surrounded with a clamping fit by a tube 8'' produced from molybdenum strip. The molybdenum tubes 8'' extend in each case over the greater part of the corresponding unwound end 5a''. Furthermore, the molybdenum tubes 8'' facilitate the welding of the filament ends to the power supply leads 3, 4, likewise consisting of molybdenum.

The invention is not restricted to the exemplary embodiments explained in more detail above. The covering

filaments 8, 8' or molybdenum tubes 8'' are only required if especially high requirements are demanded of the vibration resistance. Instead of covering filaments 8, 8' or molybdenum tubes 8'', in this case, however, other supporting means may also be used for the incandescent filament. For example, instead of covering filaments 8, 8' or molybdenum tubes 8'', the power supply leads 3, 4 may be made correspondingly thick and the unwound ends 5a, 5a' of the incandescent filament 5, 5' connected to them may be made correspondingly short, so that the power supply leads 3, 4 already ensure a great vibration resistance.